

Patent Claims

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1. Method for reprocessing waste oils and production of high-grade base oils, comprising the following steps:
  - A) distillation of the waste oil for removal of low boiling organic fractions, as well as drying of waste oil by removal of water;
  - B) distillation under vacuum of the waste oil obtained according to step A) for segregation of fuel oil and diesel fractions with boiling cut of approximately 170 to 385°C in form of high grade fuel oils;
  - 10 C) non-destructive distillation of the distillation residue from step B) by means of thin film evaporation in high vacuum to obtain a lubricating oil fraction with a standard viscosity range, which can be separated, as needed, via a subsequent distillative fractioning step - if appropriate under vacuum - into boiling cuts of different viscosity states;
  - 15 D) if appropriate, non-destructive distillation of the bottom product from step C) in order to obtain a lubricating oil fraction of higher viscosity state from the higher boiling range which can be segregated, as needed, possible under vacuum, by means of a subsequent distillative fractioning step;
  - 20 E) extraction of the fraction or fractions in the form of lubricating oil fractions or boiling cuts of different viscosity states from step C) and optionally D) with N-methyl-2-pyrrolidone (NMP) and/or N-formylmorpholine (NMF) as extraction medium in order to obtain very high grade base oils whereby the extraction is executed in such manner that undesirable constituents are removed in an almost quantitative manner, and the contents of the polycyclic aromatic hydrocarbons (PAK) and polychlorinated biphenyls (PCB) lies, respectively, clearly below 1 mg/kg.

2. Method according to Claim 1, characterized in that the waste oils to be reprocessed are treated with concentrated watery alkaline solution as reagent in order to segregate interfering constituents, in particular for process step C).

5 3. Method according to Claim 2, characterized in that the alkaline solution is added during distillation according to step A).

4. Method according to Claim 2 or 3, characterized in that the alkaline solution is potassium hydroxide solution.

10 5. Method according to Claim 4, characterized in that the alkaline solution is highly concentrated specifically approximately 5 to 50% potassium hydroxide solution.

6. Method according to Claim 5, characterized in that the feed (charge for extraction) is imparted an alkalinity reserve, which prevents the otherwise usual, partially even irreversible, acidulation of the reclaimed extraction medium.

15 7. Method according to Claim 1 or 2, characterized in that the distillation in step A) is performed at normal pressure or at slight under pressure of up to approximately 600 mbar and at a temperature of approximately 140 to 150°C.

8. Method according to at least one of the preceding Claims, characterized in that the extraction is performed in an extraction column, by counter flow process.

20 9. Method according to at least one of the preceding claims, characterized in that the extraction is performed in isothermal manner, at a temperature in the range of approximately 50 to 90°C.

10. Method according to Claim 9, characterized in that the extract phase is cooled down and that the settling oil phase is again added to the feed.

11. Method according to at least one of Claims 1 to 8, characterized in that the extraction is performed with a temperature gradient, whereby the temperature is 5 adjusted at the column head (run off raffinate) to approximately 50 to 90°C and at the column end (extract run-off) to approximately 10 to 50°C.

12. Method according to at least one of the preceding Claims, characterized in that the waste oil to be reprocessed has a contents of polychlorinated biphenyls (PCB) or PCB substitutes of up to approximately 250 mg/kg.

10 13. Method according to at least one of the preceding claims, characterized in that the waste oil to be reprocessed has a contents of vegetable oil(s) of up to approximately 5%.

14. Base oil, obtainable according to at least one of the method claims 1 to 13.

15 15. Use of the base oil according to Claim 14 as starter product for lubricants or for products of the petro-chemical industry.